National Institute of Environmental Health Sciences

A review of the potential impacts of climate change on surface water quality

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Abstract:

It is now accepted that some human-induced climate change is unavoidable. Potential impacts on water supply have received much attention, but relatively little is known about the concomitant changes in water quality. Projected changes in air temperature and rainfall could affect river flows and, hence, the mobility and dilution of contaminants. Increased water temperatures will affect chemical reaction kinetics and, combined with deteriorations in quality, freshwater ecological status. With increased flows there will be changes in stream power and, hence, sediment loads with the potential to alter the morphology of rivers and the transfer of sediments to lakes, thereby impacting freshwater habitats in both lake and stream systems. This paper reviews such impacts through the lens of UK surface water quality. Widely accepted climate change scenarios suggest more frequent droughts in summer, as well as flash-flooding, leading to uncontrolled discharges from urban areas to receiving water courses and estuaries. Invasion by alien species is highly likely, as is migration of species within the UK adapting to changing temperatures and flow regimes. Lower flows, reduced velocities and, hence, higher water residence times in rivers and lakes will enhance the potential for toxic algal blooms and reduce dissolved oxygen levels. Upland streams could experience increased dissolved organic carbon and colour levels, requiring action at water treatment plants to prevent toxic by-products entering public water supplies. Storms that terminate drought periods will flush nutrients from urban and rural areas or generate acid pulses in acidified upland catchments. Policy responses to climate change, such as the growth of bio-fuels or emission controls, will further impact freshwater quality.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Food/Water Quality, Food/Water Security

Extreme Weather Event: Flooding

Food/Water Quality: Biotoxin/Algal Bloom, Chemical

Geographic Feature:

resource focuses on specific type of geography

Freshwater, Ocean/Coastal, Urban

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : United Kingdom

Health Co-Benefit/Co–Harm (Adaption/Mitigation): ☑

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

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Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Foodborne/Waterborne Disease

Foodborne/Waterborne Disease: Marine Toxin Syndrome

Intervention: ☑

strategy to prepare for or reduce the impact of climate change on health

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Medical Community Engagement: ☑

resource focus on how the medical community discusses or acts to address health impacts of climate change

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Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation, Mitigation

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

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